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## HYDROTHERAPY OR WATER CURE

A lecture given before the Naturopathic Association of Los Angeles, Cal.

By DR. C. SCHULTZ

One of the many therapeutic agencies of the Naturopathic school is hydrotherapy. I claim it is the most important one, for the following reasons:

First—Water can be had for the asking in almost any place.

Second—It is the most effective of all natural therapeutic agencies.

Third—It can be used in one form or another, in the broadest sense of the word, in all ailments and diseases, without exception.

Of course hydrotherapy is not a "cure all." It often has to be used in connection with other natural remedies, and must be used with common sense. This is one reason why it has become so popular with the laity, especially in Germany, while it is not popular with physicians.

The reasons why hydrotherapy is not practiced by all physicians are several, mostly selfish ones. I am sorry to add that many Naturopathic physicians have abandoned hydrotherapy. Sometimes the physician has not money enough, or thinks he has not money enough, to equip his treatment rooms with the suitable arrangements and appliances. Expensive equipments are not necessary. Father Kneipp for many years used a common sprinkling can with the sprinkler taken off, and a wash-tub. An ordinary bath-tub, a wash-tub, a sprinkling can, and a lounge or massage table, blankets and sheets will suffice in many cases, and have served me well for many years. Fine equipment does not make a physician.

Another reason for not practicing hydrotherapy is that a majority of

physicians think it beneath their dignity to use water. As if anything that will help a patient could be beneath the dignity of any physician, no matter what his name or school may be. What the leading physicians of the continent of Europe think of hydrotherapy is shown by the fact that it is not only taught in every university, but in most of them special independent chairs of hydrotherapy have been established. I am sorry that this is not the case in America, where even trained nurses have very little or no training in the use of water. Often I have found it necessary, not only to instruct the nurse in the practical use of water, but have had to do most of the water treatment myself. All nurses seem to know is, how to administer drugs, give hypodermics and take the pulse and temperature; that is, unless one has a nurse who has been trained in a naturopathic institute, or in one of the Battle Creek sanatoria.

The founders—or rather the rediscoverers—of hydrotherapy (for hydrotherapy is as old as history) were men from every walk of life, educated and uneducated. Singular to say, among them was not one regular physician. I do not mean to say that the medical profession did not finally accept hydrotherapy, as they did other natural therapeutic measures. Of course, as naturopathic physicians you are more or less acquainted with the history of hydrotherapy, therefore it would be a waste of time to go into a detailed history. I must, however, make reference to Prof. Wilh. Winternitz, of Vienna, who, in my opinion, has done more to

make hydrotherapy acceptable to the profession than any other writer. His books and writings have convinced the profession that hydrotherapy was a most powerful healing agent in the hands of a well trained and honest physician. What Father Kneipp did for the people, Winternitz has done for the profession.

Father Kneipp, whose books have been translated into thirty-two languages, has surely done more than any man to popularize the water cure. Many a physician has sat at his feet and has learned from him the first principles of hydrotherapy. I mention this because it seems to be the tendency of many of the profession to belittle the work of this great master. "Honor to whom honor is due."

Some physicians have endeavored to restrict the use of the term "hydrotherapy" to the employment of cold water alone. This is a mistake that could only be made by those who have not studied this subject thoroughly. Hydrotherapy includes the application of water in any form, from the solid and fluid to vapor; from ice to steam, internally and externally.

I will not here go into a discussion of internal treatment by water, but take for my subject its thermic and mechanical action upon the cutaneous surfaces of the body. In order to understand this we must study:

First—The anatomical construction and physiology of the skin, from a hygienic standpoint.

Second—The physical properties of water, which render it capable of producing these effects.

As important as the intimate knowledge of this subject is to the hydrotherapist, the time is too short for me to enter into this subject thoroughly.

The skin has three functions to perform.

First—It is an organ of sense.

Second—It is an organ of excretion.

Third—It is a heat regulator.

This third function is the most important function of the skin, when considered in connection with hydrotherapy. Those portions of the skin which

contain the blood and nerve supplies interest us most. I hold that a more careful and elaborate study of these structures than is usually made by hydrotherapists would be of great benefit to them.

I will discuss first the tissue of the skin. The skin comprises a large variety of the tissue elements in a complicated arrangement, directly or indirectly connected with the functions of all other parts of the body. The epidermis, or outer layer, acts as a protection to the more delicate and sensitive structures underneath. The dermis, or true skin, is made up of two fairly distinct layers, the *pars papillaris*, upon which the epithelium rests and the *pars reticularis* beneath, the former lying next to the *panniculus adiposus*. The knob-like projections of the papillary layer are of two types. Those containing blood vessels (*vascular papillae*), and those containing nerve endings (*tactile papillae*). Both layers of the dermis consist of the reticulum, composed of bundles of connective tissue, surrounded by elastic fibers. For the most part, the fibrous bundles lie parallel to the skin surface. Those fibres nearer to the surface are finer and more densely packed, producing a felt-like texture, while those of the deeper layers nearer the subcutaneous fat, are coarser and more loosely arranged. Smooth muscle fibres are intimately associated with elastic fibres. The two together constitute one of the most important anatomic arrangements of the skin. In many parts of the skin the muscle fibres are formed like a network, contracting diagonally. The muscular tissue exists mostly as the *erector pilorum*, disposed in bundles in connection with the hair follicles, and lying in an oblique direction through the thickness of the skin. These muscle bundles are surrounded and traversed by elastic fibres, so that they are inclosed in a dense network of elastic tissue, threads of which serve as tendons to connect the ends of the muscular fasciculus to the connective tissue bundles of the corium, or deep layer of the skin.

I now turn to the functions of the skin. First—as an organ of sense. Prof. Roehrig has well said that next to sight, the sense of touch is the most important of all the senses. This brings us to the nervous system of the skin. The nerves of the skin are: the secretory, the vasomotor and the temperature nerves. Dr. Baruch, in his *Principle and Practice of Hydrotherapy*, says: The anatomical distribution of the nerves throughout the skin and their connection with the central nervous system are so perfect and complete that not the finest pinpoint may penetrate its uppermost layer without calling into action all those agencies by which the human organism protects itself. The cutaneous nerve endings guard most of the functions of the human body. They are constantly exposed to irritation by heat and cold, which they convey to the vasomotor, respiratory and cardiac centers and to the muscles, in order to arouse in them by reflex action such a degree of innervation as may be required to ward off any damaging influence that may approach from without.

The nerve endings which fulfill this important function are the tactile corpuscles and pacinian bodies and club-shape terminals which compose the sense of touch. The latter is composed, according to Goldschneider, of a large number of specific sensations, each of which is brought about by separate nerves. There is a system of nervous sensation spread through the skin, not arranged in any recognizable type, which seems to enable us to "feel our skin." While the pressure nerves give information of those objects which touch us from without, the nerves of sensation are the carriers or conveyors of the so-called general sense. Temperature sensations are divided into positive, or sensations of heat, and negative, or sensations of cold, according to whether the temperature of the object is higher or lower than that of the body. Inasmuch as the temperature of the skin is constantly subjected to fluctuations, it is clear that a sharp distinction between these conceptions

is not easily made. Temperature impression is intensified by the number of nerve endings receiving it, and by the greater or lesser thickness of the epidermis, which is a poor conductor of heat.

To sum up, we have in the nerve apparatus of the skin facilities for perceiving pain, temperature and space, the aggregate of which endows it with all the intricate functions of an organ of sensation.

I will now turn to the second function of the skin, that of excretion: That the skin is important as an organ of excretion has been recognized since the time of Galen. Suppression of the perspiration is a menace to health. The extensive glandular structure of the skin discharges an enormous amount of water. Carbonic acid also is exhaled through the skin, and even urea, the latter more frequently and copiously in cases where the kidneys are not in good working order. In various other diseases, especially in diseases of the lungs and heart, in which other physiological functions of these organs are diminished, the exhalation of carbonic acid by cutaneous excretion is usually increased. You will have witnessed in severe cases of asthma, the profuse perspiration of the patient. In such cases the walls of the cutaneous vessels are dilated; more water, aqueous vapor, and carbonic acid are excreted, and the difficulty of breathing is relieved. Also, when the heart's action is embarrassed, the lumina of the cutaneous vessels become distended, affording some compensatory action to tide the patient over immediate danger. The clammy sweat, so characteristic of cardiac inadequacy, is a commonly observed clinical phenomenon.

Now we come to the third phase—the skin as a heat regulator: This is the most important function of the skin in connection with hydrotherapy. It depends to a great extent upon the two functions previously referred to. The maintenance of the bodily temperature is of great importance to the human organism and the contribution of the skin to this process is indispensable.



It is a physiological fact that the standard of the body temperature depends upon the maintenance of an equilibrium between heat production and heat loss. Heat is produced by the combustion of non-nitrogenous substances, chiefly in the muscles, and that heat is given off by perspiration and radiation from the cutaneous surface. When heat loss exceeds production, the temperature is lowered until the processes of life are interrupted, and life ceases.

We come now to the physical properties of water. These are, first: The capacity for gathering, absorbing and conducting heat and cold. Water possesses a remarkable capacity for absorbing heat without being itself much raised in temperature, and giving off heat without losing materially in temperature. The amount of heat sufficient to raise the temperature of two pounds of oil of turpentine, eight pounds of iron, or thirty-five pounds of mercury to thirty-four degrees, will raise one pound of water only to the same degree.

The temperature conducting capacity of water is twenty-seven times greater than that of air. Water conveys to the skin much stronger thermic impressions than air, a fact easily discovered in exchanging a room with a temperature of seventy degrees for a bath at the same temperature.

Second—The flexibility of water: The enormous physical changes which water is capable of exerting as the result of different temperatures enlarges its value as a flexible thermic agent. At thirty-two degrees F. water solidifies; at two hundred and two degrees it becomes elastic, increasing seventeen hundred times in volume. In the form of ice it possesses valuable thermic properties which are impossible in other forms.

In the form of steam it is again a most useful agent. The application of water has a wide range by our ability to apply it at any temperature. A temperature of from 34° F. to 120° F. renders water a most flexible therapeutic agent. I use here not the common

terms hot and cold water because they do not express absolute accuracy. People differ in regards to toleration of heat and cold; what seems warm to one person is very hot to another, and what seems to be cool to one, is cold to another. Therefore it is more satisfactory to define yourself to degrees. The following table will illustrate the relation of common names as to degrees:

Very hot.....	104° F. and above
Hot .....	100° to 104° F.
Warm .....	92° to 100° F.
Neutral .....	94° to 97° F.
Tepid .....	80° to 92° F.
Cool .....	70° to 80° F.
Cold .....	55° to 70° F.
Very cold .....	32° to 54° F.

I say here that I do not approve of the ice bag, in fact I never use the ice upon the cutaneous surface contrary to widespread custom. My reasons are good ones and are indorsed by such authority as Prof. Baruch, Prof. Winternitz and others.

If you remember I said that water had great absorbing power, and that is the reason I do not advocate ice, because ice has not this power. My opinion is that like in any other cases, convenience plays a large part in using ice instead of water. It is so easy to lay the ice bag upon the parts which suffer, because ice keeps cool so long, but water will have to be renewed ten times in the same period that one application of ice would require. But the ice does not reduce the inflammation as a cold water application will do. Ice acts as a local anesthetic and therefore should never be used in cases of appendicitis, pneumonia, peritonitis and even not in cases of fever. The third physical property of the water is the perfect control of the fluidity. We may change the size, form and character of the stream and direct it to any or all portions of the body and by this limiting the local and general effects with nicety and precision. The various hydriatric procedures, full bath, half bath, Sitz bath, spinal douche, upper and lower douche, chest and knee

douche, etc., etc., devise their technique and application from this property of water.

4. The capacity of water as influenced by different degrees of pressure gives it the power to produce mechanical effects upon the nerve and blood supply of the skin, which form one of the most interesting and least appreciated elements of Hydrotherapy. By proper mechanical contrivances, water may be applied almost without pressure, as by a sponge, or by pouring from a vessel, which is just above the level of the cutaneous surface; it may flow from a height with great force, or may be driven upon the skin by compressed air, or applied by a rubber hose with or without a nozzle from a shorter or longer distance.

Here again we find a range of action which enables the physician to produce varied effects, adapted to the therapeutic indications which may present themselves.

In order to show what effect water has in disease, we must show its action in health. (I quote here from Baruch.) "The action of thermic and mechanical

application of water, either cold or hot, is that of irritants to the peripheral sensory nerves. a) Irritation may be conveyed to some portions of the central nervous system, and thence reflected by motor fibres to the various parts which we desire to influence. b) Changes of the total enervation of the parts which we desire to influence. b) may be produced by effects upon the ganglionic centres, which exist in the nerve supply of the vessels, and which perform the function of nerve centres within their immediate sphere without depending upon reflex impulses from the brain or spinal cord. The effect of these nerve irritants depends, like that of other irritants, upon their intensity, upon the extent of surface receiving their impact, upon the susceptibility of the entire organism or of the point of application, and also upon the suddenness of the impact. The thermic and mechanical action of water upon the circulation, respiration, temperature, tissue change and secretions, forms the basis of all those notable results which Hydrotherapy has obtained.

*(To be continued)*

## THE BEGGAR CAT

By ELLA WHEELER WILCOX

Poor little beggar cat, hollow-eyed and gaunt,	Stealing to an open door, craving food and meat,
Creeping down the alley-way like a ghost of want,	Frightened off with angry cries and bromed into the street.
Kicked and beat by thoughtless boys, bent on cruel play,	Tortured, teased, and chased by dog through the lonely night,
What a sorry life you lead, whether night or day!	Homeless little beggar cat, sorry is your plight.
Hunting after crusts and crumbs, gnawing meatless bones,	Sleeping anywhere you can, in the rain or snow,
Trembling at a human step, fearing bricks and stones.	Waking in the cold, gray dawn, wondering where to go,
Shrinking at an outstretched hand, knowing only blows,	Dying in the street at last, starved to death at that,
Wretched little beggar cat, born to suffer woes.	Picked up by the scavenger—poor tramp cat!

# HYDROTHERAPY OR WATER CURE

A lecture given before the Naturopathic Association of Los Angeles, Cal.

By DR. C. SCHULTZ

(Continued)

## Effect of Hydratric Applications on the Circulation

That system of animated hydraulics which in the living organism is known as "Circulation of the Blood" forms the great highway upon which the products for its maintenance and growth are conveyed, and by which the products of waste and repair incident to the performance of all functions are eliminated. It follows, therefore, that any agent which is capable of exercising even the slightest influence upon an apparatus which is destined for these important tasks, must be capable of exercising in disease an analogous influence upon the organs and their functions which come under the domain of its action. Therefore we must study the mechanical and thermic action of water upon the circulation.

I will take up first: The effect upon distribution of the blood and upon blood pressure.

Second: Effect upon the composition of the blood.

### 1. The Effect of Hydratric Applications upon the Distribution of the Blood

These effects may be divided into:  
a) Vasomotor or reflex effects; Mechanical or hydrostatic effects.

There are two modes of effecting changes in the circulation, by reflex excitation from the sensory nerves, namely, one influencing the calibre of vessel and the other acting upon the propulsive power of the heart muscle.

Experiments made by Besold, Ludwig and Roehrig show that the increased arterial pressure and rapidity of the blood stream following the narrowing of the vessels produced by weak cutaneous irritants is not induced by an increased propulsive power of the heart, because these effects are pro-

duced also when all the nerves leading to the heart are cut off. That the heart beat and mere mechanical elasticity of the blood vessels are not the only forces, which propel the blood, is shown in cases of hemiplegia after a stroke of apoplexy. Examination will show a decided lowering of blood pressure on the affected side and a consequent stasis, indicated by the cyanosis and lower temperature on that side. But on account of the contraction of the terminals of the arterioles, which creates a stasis of blood in them, therefore the increase of blood in them is due to the prevention of the outflow of blood from these contracted vessels, and secondary to the increased resistance of the stream at the Periphery.

Roehrig and Naumann proved that weak cutaneous irritants produce a narrowing of the small arterioles, with a rise of pressure, and by strenuous resistance at the periphery, the heart is made to contract more rapidly. Intense cutaneous irritants fatigue and paralyze the normally existing nerve supply of the blood vessels which branches from the medulla oblongata. These produce a relaxation and dilation of the peripheral arteries with decrease of pressure, but at the same time the inhibitory action of the pneumogastric is increased, producing a slow and strenuous cardiac contraction, which may, when excessive, produce death by vagus tetanus. (This is one reason why I do not advocate the ice-bag.)

These important functions resulting from irritation of the sensory nerves in the skin must be carefully borne in mind, because they have great practical significance in most hydratric procedures, whose aim it is to produce thermic irritations in different degrees. The impact of cold conveyed by any medium to the skin induces pallor and shriveling of the same. Bier (in Die

Entstehung des kolateral Kreislaufes) has demonstrated that when blood has been driven out of the vessels of the skin (as by an Esmach bandage). The latter actively draws arterial blood into them when relieved of constriction, while they admit venous blood very slowly. The same process ensues when blood is driven out of the cutaneous vessels by the constriction of cold (the thermic bandage).

b) Mechanical or Hydrostatic effects. The hydiatric applications upon the distribution of blood is not only reflex but to a certain extent hydrostatic. This was proven by Maximilian Schüller who trephined rabbits, carefully exposing to view the vessels of the Pia-mater, without disturbing the dura, which by its transparency facilitated his observation. He carefully noted the normal circulation of these vessels, and ascertained that even simple pressure upon the belly produced dilation of the veins and sometimes of the arteries' also. When he applied pieces of ice upon the dura mater, he observed very energetic contraction of the veins and arteries of the Pia, which continued half a minute even after removal of the ice. When he placed cold wet compresses upon the belly of the rabbit the vessels of the Pia-mater invariably dilated, cerebral pulsation became more pronounced and slower, and respiration was deepened and slowed. When warm compresses were applied, the arteries and veins of the Pia-mater contracted, the pulsation became less pronounced and more frequent, and respiration more shallow and rapid. These manifestations were also observed, but with mere pronounced effect, after immersion of the entire body into cold or hot water. Schüller's experiments prove without doubt that a connection exists between the various external applications of water and the typical changes in the vessels of the Pia.

#### Secondary Effects of Water Applications

Schüller further shows that the effects arising from cold and warm ex-

ternal applications do not continue if the latter are prolonged. These effects last only from two to three minutes after compresses and from five to ten minutes after baths. After a cold application which by contraction of the cutaneous vessels drives the blood into the interior vessels, including those of the Pia-mater reaction ensues on the surface. The cutaneous vessels become dilated. The arteriales and capillaries fill, so that in the healthy human subject the skin becomes decidedly reddened. This demonstrates that the Pial vessels become contracted because the large cutaneous vascular area is filled completely. If the cold applications are continued, the cutaneous vessels become paralyzed and relaxed, the muscular arteries become abnormally full, the blood is drawn into the arteries of the muscles and veins of the skin, removing it from the brain.

#### Increase of Volume

Winternitz demonstrated the following: By placing a man into an empty hip-bath-tub, and covering him with a woolen blanket, his left arm in a glass cylinder of the Plethysmograph (an apparatus for measuring the volume of the blood), apparatus and manometer were filled with water of the body temperature, and connected with the registering apparatus. Then the bath tub was quickly filled with water at 50° F. The cold water produced the usual effect upon pulse and respiration. The registration showed an even outline so long as the tub was empty; so soon as the water was poured in, the curve rose perpendicularly. This effect continued for eighteen to twenty seconds, then the line dropped slightly during the following twenty to thirty seconds, but did not reach the former level. This resulted from the local excitation of the sensory nerve endings by the cold, and from reflex effects aroused in the vaso motors of the cutaneous-vessels, which produced contraction in the entire area exposed to the cold water. The blood was driven from this part to other parts of the body including the arm.

Roehrig, Naumann and others have



made similar experiments with the same results. Baths and Packs without mechanical excitation, when applied to large portions of the body, act chiefly by hydrostatic effect, while douches and gushes which are combined with mechanical effects, act chiefly by reflex influence.

### Blood Pressure

The blood driven out of the narrowed vessels is driven into the collateral or general circulation, the vessels which receive this blood contract more vigorously and force the blood which has been accumulated and stagnant within them, to move on and increase their current. Applications of cold water to the cutaneous surface, causes an increase of blood pressure. The deepening of the respiration also results from the external impact of cold water increased the rapidity of the circulation of the small vessels and induces an increased return flow of blood into the auricle and a more active filling of the arterial system, which in the cutaneous arterioles is resisted by the muscular and elastic fibres surrounding them.

O. Müller reports from the Leipsich Clinic the result of two thousand blood-pressure-measurements, concluding that: 1. The influence of all baths, not in motion, upon blood pressure is due to thermic excitation, which gives below the temperature of the skin, produces increase of blood pressure during the entire bath, with diminution of the pulse rate, which is decidedly influenced by lowering the temperature of the bath. 2. Baths above the temperature of the cutaneous surface, up to 104° F., produce at first a brief rise, afterwards dropping below the normal pressure which again rises; the pulse rate is diminished until 98° F. is reached, then increases again. 3. Baths above 104° F. increase the blood pressure, as do the cold baths, with increase of pulse rate. Normal blood pressure returns after all baths in one-half up to two hours, frequently reading a subnormal degree. 4. Baths with active motion (half bath and waist

baths) the mechanical excitations exercises the chief influence. Baruch says well: It is clinically demonstrated and physiologically explained that cold enhances the tone "of the entire circulatory apparatus," while warmth diminishes the tone.

## II. Effect of Hydratric Applications upon the Composition of the Blood

### 1. Changes in the Corpuscular Elements of the Blood:

Dr. Winternitz investigated the number and relative proportions of red and white cells in the blood before and after cold applications, and found that there is a considerable change in their ratio after these procedures.

The maximum increase of red blood cells after cold applications in fifty or more people, amounted to 1,860,000 in the cubic millimeter; the maximum increase of white cells was almost three times as much. (It is a well known fact that to one white cell, there are from four to eight hundred red cells in the blood in ordinary circumstances.)

Here are some results from Dr. Strasser's experiments:

	Before	After
Red cells .....	4,570,000	5,200,000
White cells .....	4,600	6,400
Hemoglobin .....	85%	95%

### Effects of graduated half bath:

	Before	After
Red cells .....	4,880,000	5,420,000
White cells .....	5,400	8,400
Hemoglobin .....	85%	95%

These changes were maintained for from one-half hour to one and two hours or longer after applications, gradually returning to the normal, these observations have been confirmed by Baruch, Kellogg and others.

### Changes in the Lymph Movement

Thermic irritants exercise an influence upon the flow of lymph.

1. By reason of changes in other organs and by changing the calibre of the lymph vessels.

Thermic irritants of low temperature contract these vessels, higher temperature dilate them.



2. The reason for these changes are found in the nervous system because the lymph vessels are subject to the same influence as the blood vessels.

Vasometer nerves produce, when excited by low temperature, contraction; and when excited by high temperature evoke dilation.

*(To be concluded)*

3. The vasometer nerves of the lymph vessels are not identical with the responding nerves of the blood-vessels; their activity is independent of the circulation. A warm bath or compress will increase the absorption of lymph; if followed by a cold douche, gush or some other cold procedure.

## SCIENTIFIC DIETETICS

By DR. R. MOERSHELL

Fasting is the best method for commencing the raw or unfired foods. You can make the change at once or gradually, but let me say that if you start right away on the raw foods it will be quite a struggle and if you commence gradually, I am afraid it always will be gradually. So those are the reasons that I recommend fasting in commencing a new diet.

You must remember that the system has adjusted itself to the cooked foods and any sudden change would be somewhat of a shock to the system, although the adjustment would be rapid. Now to be complete we must start at the beginning. I will first describe the fast and how conducted.

Remember that fasting is a means to an end. It thoroughly cleanses the system of all the poisonous waste products. A general housecleaning is taking place during a fast. Every organ, in fact the whole system is excreting the poisonous waste material contained therein. The mucous membranes, kidneys, liver, intestines, skin, lungs, they all have a part in this cleansing process.

The water you drink dilutes the poisons to a great extent, which helps in the eliminatory processes. Water also stimulates the circulation. This, then, shows the necessity of plenty of pure water during the fast. You will feel very languid and tired and about "all in" at first for the first three to seven days, possibly longer. Do not be frightened at any of the symptoms dur-

ing the fast, for they are harmless. In order to give you some idea, I will describe some of the most frequent symptoms which are as follows: Acute hunger, especially at the regular meal time, dizziness, spots before the eyes on arising from a lying or sitting position, weakness the first few days due to the elimination of poison, as they are circulated through the system they naturally will irritate the nerve centers; also weakness follows from the lack of food, stimulation, constipation, nausea and vomiting, especially in the morning. Sometimes at the start you will not experience any sensation of hunger, you may lose this entirely. Headache is of a very common occurrence. You sometimes have every symptom of a "cold" in the head or general debility. The breathing is slower and deeper. The excretory glands of the skin are especially active at this time. Saliva is either increased or diminished. Nervousness, drowsiness, but restless at night. Now I have mentioned the most common symptoms that happen in most of the cases and all of these do not show in every person. Some may have one, some another, just as the symptoms of a disease will vary to a great extent.

In commencing the fast, start in to drink water, take about one glass of water every hour or three quarters of an hour or you may take one half glass of water every half hour or twenty minutes. After the first day this may be lessened in quantity,

*(To be continued)*

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(Concluded)

## Influence of Hydriatric Applications upon Respiration

Impulses from every sentient surface or from almost every sensory nerve may modify respiration. There are at least two sensory tracts of nerve fibres passing from the cutaneous surface to the respiratory centre; viz., fibres for inhibition and for excitation. When a very cold or very hot bath is given a deep inspiration is invited, which is interrupted by spasmodic efforts, if the bath is continued, compensatory agencies regulate the respiratory movements and the circulation adapts itself to the changed condition in the blood distribution. The greatest irritation of the respiratory centre is produced by cold applications, especially upon the chest and abdomen and especially so, when a chest or abdominal gush is given. The phrenic nerve probably is irritated in these cases, giving rise to spasmodic action of the diaphragm, which seems to threaten cessation of breathing. But as soon as more arterial blood reaches the respiratory centre, as the result of the increased flow of blood from the Periphery, this spasmodic action ceases and the respiration efforts adjust themselves to the changed conditions. The respiration remains deeper for a considerable time. The result is an increase of consumption of oxygen and carbon.

## Influence of Hydriatric Procedure upon the Muscular System

The effect of a cold bath or a cold gush upon the muscle is such, that it increases the working capacity of the muscle and restores the capacity after it has been used up by exercise or labor.

## Influence of Hydriatric Procedure upon Tissue Change

I have shown you the influence of hydriatric procedures upon the circula-

tion, respiration and muscular action. I have shown you that the effect of these procedures is far reaching in health; that not only the quantity but the quality of the blood of the body are controlled and that muscular activity is enhanced. As functional activity is the chief agency in producing tissue change, and this functional activity depends upon the blood supply in the organs, we may be influencing the organs to exercise a powerful effect upon the tissue change. Roehrig, Zuntz, Liebermeister and Goldscheider proved that thermic and mechanical irritation by means of cold water upon the cutaneous surface arouse cell activity and does affect tissue change. Liebermeister and Goldscheider in their classical experiments showed a constant increase of carbon production after application of cold water.

Winternitz and Paspischl have shown the influence of thermic irritants upon the respiratory exchange of gases. They found in the very decided increase of oxygen consumption and carbon elimination, evidence that the oxidation processes in the body were powerfully increased by these influences. Dommer found an increase of nitrogen elimination after a bath of 50° to 56° F. lasting a half an hour. Flavard and Lepine came to the same results. Formanek made observations on a medical student; the result was, after a single cold bath the excretion of nitrogen was changed very little, but when two cold baths daily were given on three successive days, a more decided abstraction of heat took place; the elimination of nitrogen in the urin increased markedly, from 13.43 to 14.51 gm. The amount was 1.5 gm. more than on the normal days. The excretion of uric acid kept pace with the excretion of nitrogen. Strasser concludes his valuable observations with

the statement that the effect of valuable observations with the statement that the effect of Hydrotherapy upon the tissue change is to be explained by the influence of these procedures upon the activity of the living organism.

### **Influence of Hydriatric Procedure on Temperature**

The temperature of a living organ depends upon the amount of arterial blood circulating within its tissue. All tissue change, all organic action, is in direct ratio to the quantity of arterial blood circulating in the organ, and therefore depends upon vascular activity, by means of which excretory and secretory elements are carried to and from it. That the applications of water in different form reduces the temperature, has been an accepted fact since the time of Adam. Many physicians thought and maybe think so now that the reduction of temperature is the chief if not the sole object of Hydrotherapy, but they are mistaken, as has been proved by the wonderful cures in the different Hydropathic Institutes in Europe and this country.

Baruch has this to say in regard to the effect of cold water on temperature:

"The fallacious idea that cold baths, for instance, reduce temperature by the direct effect of the cold is still so firmly fixed in the minds of many otherwise well informed men, that it is regarded as axiomatic. This is one cause of the misinterpretation of the rationale of the cold bath in fevers, which has been a serious obstacle to the popularization of this life-saving measure. The truth is, that the colder the bath, the less active is its power of reducing internal temperature.... It has been shown that the influence of hydriatric procedures in health is less pronounced upon heat regulation than it is upon any other function of the human organism, and the clinical part of this work will make evident the fact that temperature reduction is perhaps the least potent factor in the therapeutic effects to be expected from the application of water."

Reaction after cold water applications is secondary, the effect of the cold water upon the sensory terminals and vessels ramifying through the skin. The primary effect—constriction of the muscular and elastic structures enveloping the cutaneous vessels—is action; the secondary effect—return of the blood to the affected part—is reaction.

There are two forms of reaction.

1) reflex reaction; 2) vascular (vasomotor). This subject I have explained when speaking of the nerves of the skin. It is a physiological fact that irritants cause local excitation, and that these irritations are at once conveyed upon sensory tracks to the central nervous system and reflected thence to other parts. Baruch has this to say:

"Cold being a thermic irritant, it is not difficult to trace most of the notable effects of hydrotherapy upon the above simple physiological law. That these therapeutic results from the application of cold water cannot be rivaled by medicinal agents is a matter of daily experience."

This from an allopathic physician who ranks high in his profession, but has been an honest investigator and a fearless exponent of the truth.

Have you ever witnessed—I am sure you have—how the dull eye of a typhoid patient brightens, and how the apathetic countenance disappears after a cold friction bath, or have you seen the same patient lapsing from delirium or coma vigil into a gentle slumber after a properly administered cold procedure? Whoever has seen this must be convinced that the rapidity of the salutary effect can be attained only through an influence over the central nervous system. Baruch sums this up as follows:

"The following data may be accepted as established: a) that the vessels lying in contact with and beneath the point of a cold application are immediately contracted by the muscular and elastic cutaneous fibres, in proportion to the degree and extent of the procedure, and the blood is driven into the



interior, chiefly into the intra-abdominal vessels.

"b) That the removal of the cold from the skin is followed by a return of the blood which had been driven out of the arterioles and capillaries, and in proportion to the degree of cold and duration of the procedure it flows back into its wonted channels.

"c) The arterial blood rushes into the empty vessels with avidity, while venous blood flows back more sluggishly."

Vascular reaction is manifested by improved activity of the cutaneous circulation, as I have stated before. I repeat: The effect of the local vascular reaction upon the heart and larger blood vessels is a physiological fact, because whatsoever improves the peripheral circulation affects favorably the heart and large vessels, which depend upon the integrity of the former for normal action.

In closing I will say something about the treatment of various diseases by water applications.

There are many methods of hydrotherapy in use. I cannot here go into details of every form of water treatment, or describe every procedure. I shall give here only a few cases where hydrotherapy may be used with advantage, and how it should be applied. The simplest kind of application is:

1) Ablution. This is given either with the naked hands or bath gloves, or a wash cloth. A sponge does not give friction, and should be avoided. In fever, water of 50 to 60° F. should be used, in order to keep the same temperature. A small piece of ice may be placed in the water. The face is first bathed, then the chest, arms, back, abdomen and lower limbs. This ablution may be given in all fever cases and in spinal meningitis; also in insomnia—in fact, in every disease. It has a most quietening effect upon the nervous system.

2) Half bath. The patient sits in an ordinary bath tub, the water to reach above the pelvis. Temperature from 68 to 80 degrees. A cold damp towel is wrapped around the head. The

attendant bathes the face, then begins to rub the back with one hand, while the other hand pours water from a rubber hose, or from a small long-handled pail, over the shoulders of the patient. The patient at the same time rubs the front of his body with both hands. Cold water is added from time to time, until the patient feels cold. The patient must be removed at once as soon as signs of shivering appear. The successive shocks imparted to the body by the moving streams of water and the friction stimulate the peripheral nerves and dilate the superficial vessels. The entire organism is refreshed, the effect being intense. This half bath has an entirely different effect from that of the full bath. If the patient is too weak, he may lie in the bath and refrain from rubbing or washing himself. Half baths may be given in acute fevers. They reduce the bodily temperature. The patient, after arising from the half bath, should be wrapped tightly in a sheet and blanket until dry and warm, and then removed to a bed.

3) The sitz bath: This is given with great advantage in all cases of female ailments, as well as in many other cases. A warm sitz bath given shortly before delivery will ease the labor pains and bring quicker delivery. Sitz baths may be hot or cold.

4) The full bath: This, either hot or cold, is a bath where a patient is entirely under the water, with exception of the head.

5) The Brand bath: Originated and introduced by Brand, of Stettin, Germany, in 1861, and indorsed by Winternitz, Ziemsen, Liebermeister and others. This bath is the most powerful alleviative measure in typhoid fever. Dr. Baruch says:

"The Brand bath properly used has reduced the mortality to one per cent, whereas typhoid fever patients treated with powerful antipyrin died at the rate of 25 to 50 per cent. It has become our solemn duty to pause and weigh the reasons of this enormous difference in the mortality."

The Brand bath is a full bath and should be given in all cases of typhoid

fever, when the temperature has reached 102 or 103, sometimes every three hours. The temperature of the bath should be 70, or even 68 degrees. In cases of children the temperature should be from 5 to 15 degrees higher; duration, ten to fifteen minutes. In order to keep the temperature the same degree a piece of ice should be added every five minutes. The attendant should rub the patient all the time during the bath. After removal the patient should be wrapped in a woolen blanket until completely dry.

6) Sheet bath: A sheet wrung as dry as possible from water at 50 to 60 degrees is thrown around the patient, and the nurse uses friction over the whole body for about five minutes. Then the patient is placed in bed again. This bath is adapted to houses where there is no bathtub, and is a valuable substitute for a full bath.

7) Hip bath: The patient's head, covered with a damp towel in the shape of a turban, is seated in a sitz bath tub, filled one quarter of its capacity, the lower extremities outside of the tub, a blanket wrapped around the knees, legs and feet, or the feet put into a foot bath tub with water over the ankles, at a temperature of 105 to 110 degrees. A sufficient quantity of water of the proper temperature is now rapidly added in such manner that it flows into the tub without touching the patient, while the patient uses frictions of the submerged parts of the body. This bath should be given quickly. It influences the circulation in the intra-abdominal vessels. Hip baths of 50 to 60 degrees should last only 10 minutes. These baths may be given in all conditions of hyperesmia of the intra-abdominal organs, in diarrhoea and dysentery. In diseases of the urinary and sexual organs duration of the bath should be only two minutes, in impotence, spermatorrhoea, sub-acute and chronic ovaritis, diseases of the uterus and its ligaments, in passive congestions of the brain, lungs and liver, gastric and intestinal ailments and constipation, the duration of the bath should be only two minutes.

8) Packs and compresses: We have packs for the head, throat, feet; lower, short, half, three-quarter and whole packs (sometimes called Spanish mantle.) All packs are given in order to extract the waste of foreign matter from the system, and at the same time lower the temperature and increase circulation. The half, three-quarter and whole packs are effective in scarlet and other fevers, in smallpox and diphtheria. The half and three-quarter packs are good in cases of general debility. They should be left on from three-quarters of an hour to an hour and a half; the whole pack at least an hour and a half, or better two hours.

Compresses are not only used in fever cases, but in cases of inflammation, wounds, diphtheria, etc.

9) Douches or gushes: These are powerful in directing the blood from one part of the body to another, and should be given only by experienced persons.

I repeat that hydrotherapy cannot be taught by lectures, but must be studied in practical work. I look for the time when not only every physician and nurse will recognize the benefits of hydrotherapy, and be able to practice it, but that also mothers may be instructed in the valuable use of water as a preventive and cure. I hope that before long I shall be able to give free public instruction in hydrotherapy.

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When the smoke arising from the clash of the "paths" has lifted, it will be found the "Naturopaths" are smiling and still on the job.

And are pretty sure to stay for a little while yet.

"What fools these mortals be."

—Burlington Gazette—Dr. R. B. Glasgow, M. D.

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"Think of the unparalleled absurdity of deliberately infecting the organism of a healthy person in this day of Sanitary Science and Aseptic Surgery with the poisonous matter obtained from a sore on a diseased calf."—J. W. Hodge, M. D.